OPERATION MANUAL FOR

MODEL 402

GAMMA RAY PROJECTOR

NOTE

Do NOT attempt to set up or operate this machine without reading without reading this Operation Manual

DESCRIPTION

The Technical Operations' Model 402 Gamma Ray Projector consists of three basic assemblies:

1. The cabinet contains a lead filled steel shell to shield the gamma ray emitting source and provides storage space for the control cable, source tube and control unit. Wheels and lifting eyes are provided for easy transport. The door of the cabinet has a lock to prevent unauthorized use.

2. The control unit consists of a source cable control unit and a battery-operated electrical signal system to indicate source position. It is connected to the source storage shield with three parallel cables. One is an electrical cable connected to the source position switches. The other two are housings for the flexible cable. The flexible cable engages a hobbed wheel in the control unit and is actuated by rotating a crank.

3. The source tube is a flexible metallic hose consisting of three sections. One section (7 feet) is attached to the source storage shield. Two extension sections may be coupled to this to extend the range of the source from the cabinet to 21 feet. The source position switch (Part No. 40205) is used on the extreme end of the source tube. This source position switch must be used in all machine applications. It contains electrical contacts which are closed when the source is correctly positioned within it. Refer to Figure 1 to identify the parts of this unit and to Figure 2 which is a schematic diagram of the Gamma Ray Projector.

UNCRATING

The unit is shipped in a wooden crate on skids. Remove the crating and lift the unit off the skid.

Open the door of the cabinet. Keys will be found with the packing slip. Remove the packing material and the control unit. Examine carefully for any damage that may have occurred in shipment. Check material against packing list. Use Figure 1 of this Manual to identify parts. Any shortages or damaged material should be reported to Technical Operations immediately.

PREPARATION FOR USE

This unit is shipped with the source tube removed and a shipping plug is installed in its place. This shipping plug is fastened in place with two screws and sealed with a tamperproof seal. To prepare the unit for use, first remove the source control unit from the cabinet. The shipping plug should then be removed by cutting the wire of the tamperproof seal and removing the two bolts which hold it in place. Install the flanged source tube over the exit tube of the shield in place of the shipping plug. Socket head cap screws and wrench are provided. Couple to this first section of source tube one or two source tubes as required. Affix the source position switch to the end of the source tube and connect the source position switch lead (red wire) at the switch, at each source tube section junction and at the shield. Test this by pulling the tip of the source position switch. This closes the contacts in the switch and should cause the "ON" light on the control unit to flash.

Do not operate the unit without the source tube or without the source position switch in place. Failure to observe this may permit the source and source cable to be completely ejected from the unit.

OPERATION

Do not attempt to operate this machine without a radiation measuring instrument. We recommend a gamma survey meter of the ionization chamber type that has a full scale range of at least 500 MR/HR. Geiger counters are, as a rule, unsatisfactory for this purpose.

Place the cabinet conveniently near the radiograph location. Place the concial tip of the source position switch at the position the source should occupy during exposure. The source position switch should be clamped or supported in this position so that it cannot move during exposure. Locate the control box as far from the cabinet as is practicable. Easiest operation will be obtained if the connecting cables and source tube are laid in straight lines without twist or with the longest practicable radius bends.

The source is actuated by turning the crank in a counter clockwise direction. Turn steadily at about 60 R.P.M. If undue resistance is encountered, reverse direction of cranking until the unit operates smoothly. DO NOT FORCE THE CRANK.

When the source reaches the source position switch, it enters the tip of the switch, pushing it outward and indicating that the unit is "ON". An "OPEN" indication means that the source has started to leave the safely stored position. "SAFE" indication means that the source is fully retracted within the storage container.

When the exposure is completed, retract the source by turning the crank clockwise until indication of safe storage is obtained.

The operator should use a survey meter or other rate indicating devices to measure the radiation when the unit is "ON" or in "OPEN" position.

Normally the radiation level 25 feet from the unshielded, exposed source will be about 22 milliroentgens per hour per curie of Cobalt 60.

Absorbing or scattering materials will affect this reading. It may be necessary for the operator to move away from the unit when exposures are made so as not to exceed the maximum prescribed operating dose of 300 milliroentgens per week.

The operating dose should be determined by a personnel monitoring film badge or pocket dosimeter.

MAINTENANCE

The Technical Operations' Model 402 Gamma Ray Projector is designed to operate with a minimum of maintenance. Regular inspection of the unit for signs of damage to the connecting cables and source tube is recommended. Do not attempt to operate the unit if cables or tubes should become crushed or cut.

LUBRICATION

The Model 402 Gamma Ray Projector has been lubricated with a Texaco uni-temperature grease. Should further lubrication be necessary, use either the uni-temperature grease or a three-in-one spray oil. DO NOT USE GRAPHITE.

INDICATOR CIRCUIT

The indicator circuit is shown in Figure 3. It consists of a battery power supply and a relaxation oscillator circuit that causes the indicator lights to flash approximately twice per second. This type of circuit requires very little power and batteries should last about one year. The batteries may fail sooner if the unit is used in extreme cold. Replacement batteries (BurgessXX45 or equivalent) are available at all radio stores.

The lamps (type NE-51) are also available at most radio and appliance stores. Batteries may be changed by removing the cover of the control box located beneath the handle. See Figure 4. Note position of the batteries and their connections before removing. The replacement batteries should be placed in the same position. NOTE: Avoid touching the battery terminals as a moderate shock hazard exists.

SAFETY

Do not attempt to operate the unit without adequate distance from the exposed source to areas where personnel have access. Determine, with a survey meter of the ionization chamber thpe, the areas that must be denied during exposures. Personnel should not be exposed to fields greater than 7-12 mr/hr on a continuous basis (40 hour week) OR more than 300 mr in a week.

Typical radiation rates from a 4 curie cobalt 60 source are given below. These figures are for a source exposed in open space and do not include the reinforcing effect of scattering or the diminishing effect of absorbers that may be noticed when walls or structures are near the source.

Distance from Source	Radiation in MR/HR
5 feet	2200
10 feet	560
25 feet	88
50 feet	22

Personnel using the equipment or working near it should wear a film badge to provide a continual record of the radiation they receive.

"Pocket Dosimeters" allow exposed personnel to read at any time the total dose received.

The film badge service and monitoring instruments are described in the general catalog of Techncial Operations, Incorporated.

WARRANTY

Techncial Operations guarantees this equipment to be free of defects in material and workmanship for a period of one year from the date the equipment was received.

In the event the equipment described above proves, during the guarantee period, to be defective in material or workmanship Techncial Operations will undertake to repair or replace the parts which prove defective.

Techncial Operations does not assume any liability or responsibility for usage of the Cobalt 60. Any use of the Cobalt 60 other than that described in the Atomic Energy Commission Authorization Form 374 is forbidden without specific Atomic Energy Commission authorization.

SHIPPING INSTRUCTIONS

If unit is shipped by carrier subject to Interstate Commerce Commission, it must have the shipping plug installed and be crated. The outside of the container should be labelled "RADIOACTIVE MATERIAL" and be plainly marked "BUREAU OF EXPLOSIVES PERMIT NO. 143".

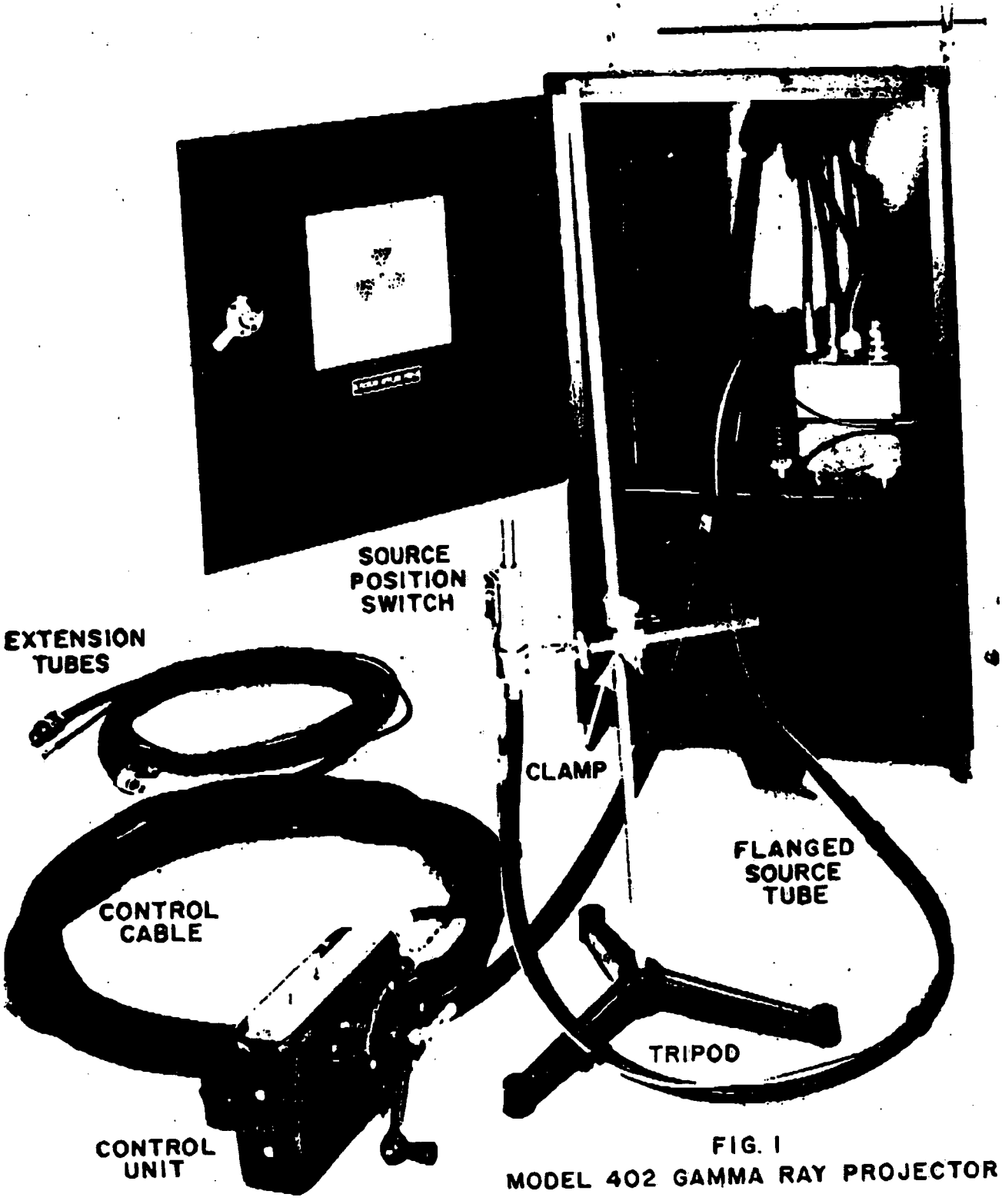
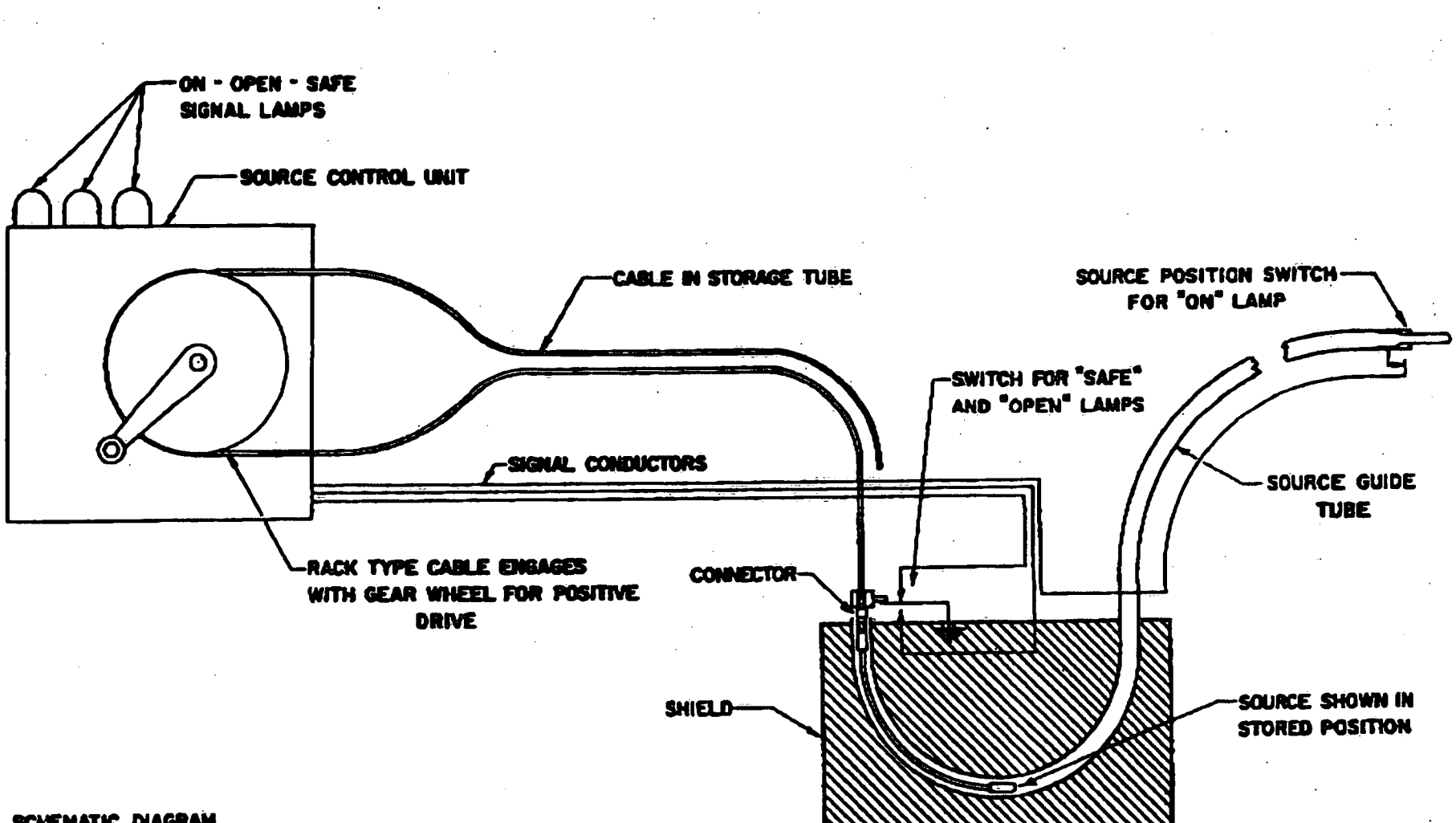


FIG. 1
MODEL 402 GAMMA RAY PROJECTOR



SCHEMATIC DIAGRAM

MODEL 402 GAMMA RAY PROJECTOR

FIGURE 2

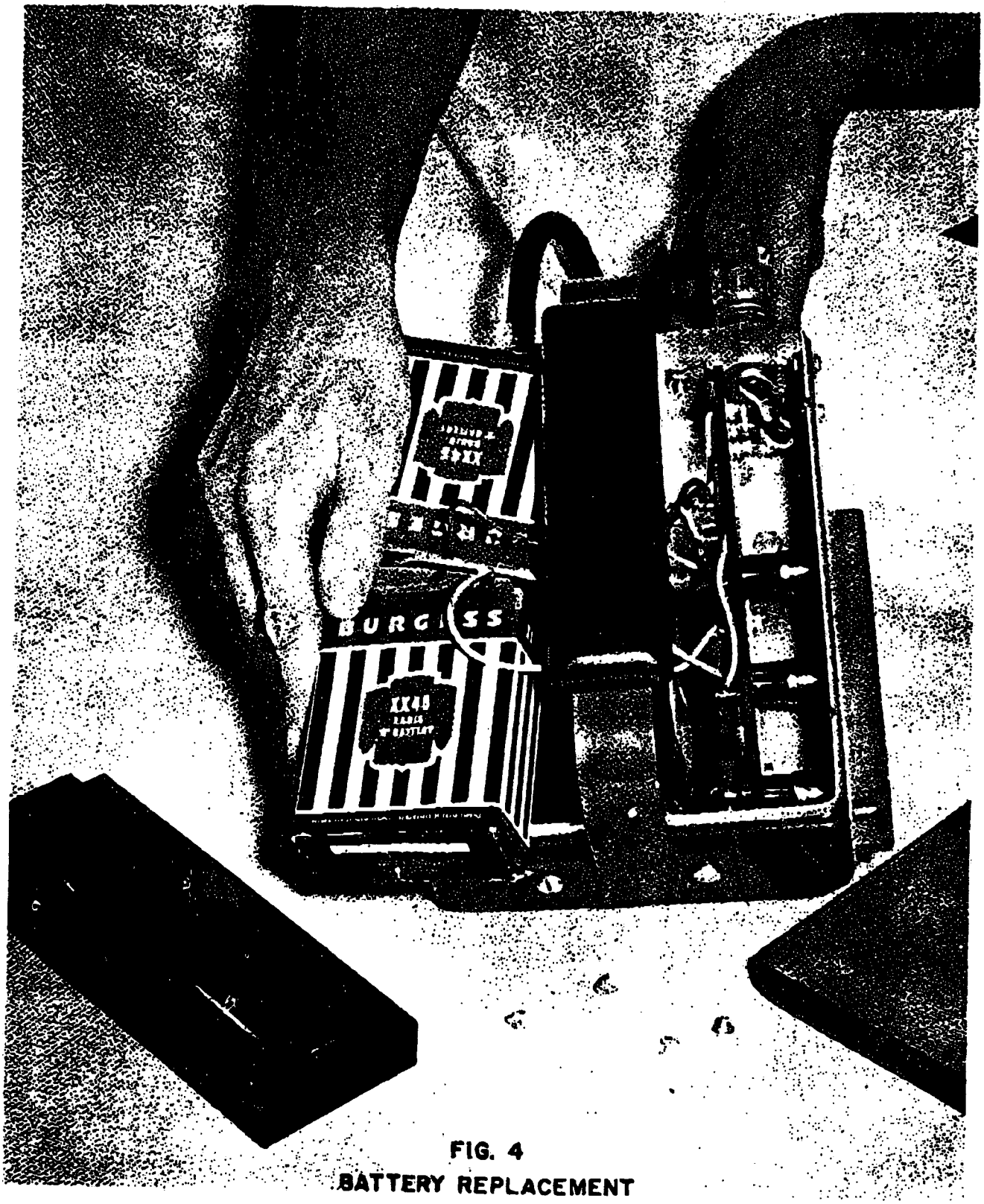
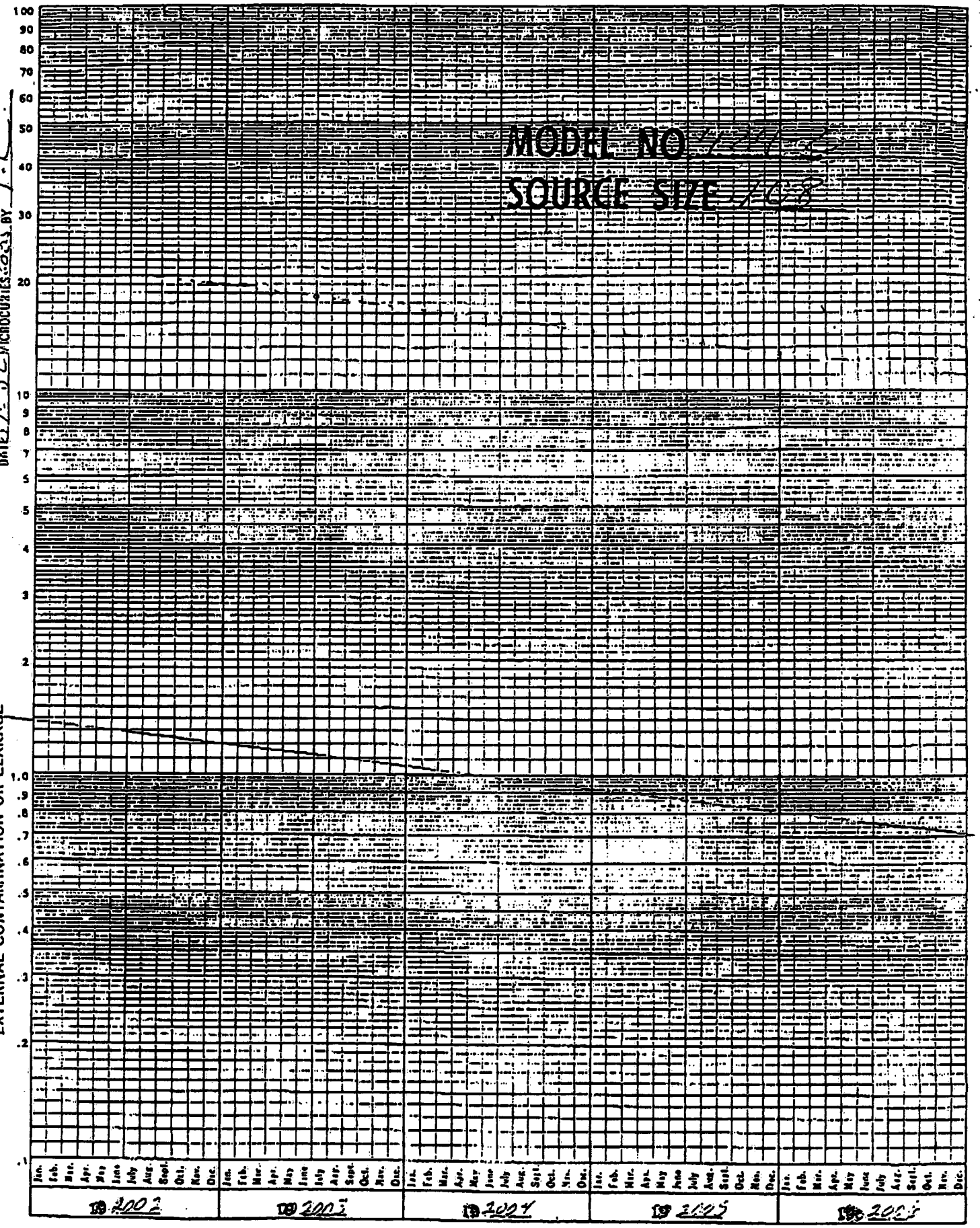


FIG. 4
BATTERY REPLACEMENT

20 Curies on 8-10-82 Source No 1932



THIS SOURCE WAS TESTED FOR EXTERNAL CONTAMINATION OR LEAKAGE

JKJ

HALF LIFE 5.28 YEARS

1.35 Roentgens/Hour/Meter/Curie

Half Value Layer Lead 1/2 Inch

container designed to prevent unauthorized or accidental removal of the sealed source from its shielded position. The exposure device and/or its container must be kept locked (and if a keyed-lock, with the key removed at all times) when not under the direct surveillance of a radiographer or a radiographer's assistant except at permanent radiographic installations as stated in § 34.51. In addition, during radiographic operations the sealed source assembly must be secured in the shielded position each time the source is returned to that position.

(b) Each sealed source storage container and source changer must have a lock or outer locked container designed to prevent unauthorized or accidental removal of the sealed source from its shielded position. Storage containers and source changers must be kept locked (and if a keyed-lock, with the key removed at all times) when containing sealed sources except when under the direct surveillance of a radiographer or a radiographer's assistant.

§ 34.25 Radiation survey instruments.

(a) The licensee shall keep sufficient calibrated and operable radiation survey instruments at each location where radioactive material is present to make the radiation surveys required by this part and by 10 CFR part 20 of this chapter. Instrumentation required by this section must be capable of measuring a range from 0.02 millisieverts (2 millirems) per hour through 0.01 sievert (1 rem) per hour.

(b) The licensee shall have each radiation survey instrument required under paragraph (a) of this section calibrated—

(1) At intervals not to exceed 6 months and after instrument servicing, except for battery changes;

(2) For linear scale instruments, at two points located approximately one-third and two-thirds of full-scale on each scale; for logarithmic scale instruments, at mid-range of each decade, and at two points of at least one decade; and for digital instruments, at 3 points between 0.02 and 10 millisieverts (2 and 1000 millirems) per hour; and

(3) So that an accuracy within plus or minus 20 percent of the calibration source can be demonstrated at each point checked.

(c) The licensee shall maintain records of the results of the instrument calibrations in accordance with § 34.65.

§ 34.27 Leak testing and replacement of sealed sources.

(a) The replacement of any sealed source fastened to or contained in a radiographic exposure device and leak testing of any sealed source must be performed by persons authorized to do so by the NRC or an Agreement State.

(b) The opening, repair, or modification of any sealed source must be performed by persons specifically authorized to do so by the Commission or an Agreement State.

(c) Testing and recordkeeping requirements.

(1) Each licensee who uses a sealed source shall have the source tested for leakage at intervals not to exceed 6 months. The leak testing of the source must be performed using a method approved by the Commission or by an Agreement State. The wipe sample should be taken from the nearest accessible point to the sealed source where contamination might accumulate. The wipe sample must be analyzed for radioactive contamination. The analysis must be capable of detecting the presence of 185 Bq (0.005 microcurie) of radioactive material on the test sample and must be performed by a person specifically authorized by the Commission or an Agreement State to perform the analysis.

(2) The licensee shall maintain records of the leak tests in accordance with § 34.67.

(3) Unless a sealed source is accompanied by a certificate from the transferor that shows that it has been leak tested within 6 months before the transfer, it may not be used by the licensee until tested for leakage. Sealed sources that are in storage and not in use do not require leak testing, but must be tested before use or transfer to another person if the interval of storage exceeds 6 months.

(d) Any test conducted pursuant to paragraphs (b) and (c) of this section which reveals the presence of 185 Bq (0.005 microcurie) or more of removable radioactive material must be considered evidence that the sealed source is leaking. The licensee shall immediately withdraw the equipment involved from use and shall have it decontaminated and repaired or disposed of in accordance with Commission regulations. A report must be filed with the Director of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, within 5 days of any test with results that exceed the threshold in this subsection, describing the equipment involved, the test results, and the corrective action taken. A copy of the report must be sent to the Administrator of the appropriate Nuclear Regulatory Commission's Regional Office listed in appendix D of 10 CFR part 20 of this chapter "Standards for Protection Against Radiation."

(e) Each exposure device using depleted uranium (DU) shielding and an "S" tube configuration must be tested for DU contamination at intervals not to exceed 12 months. The analysis must be capable of detecting the presence of 185 Bq (0.005 microcuries) of radioactive material on the test sample and must be performed by a person specifically authorized by the Commission or an Agreement State to perform the analysis. Should such testing reveal the presence of DU contamination, the exposure device must be removed from use until an evaluation of the wear of the S-tube has been made. Should the evaluation reveal that the S-tube is worn through, the device may not be used again. DU shielded devices do not have to be tested for DU contamination while in storage and not in use. Before using or transferring such a device however the device must be tested for DU contamination, if the interval of storage exceeds 12 months. A record of the DU leak-test must be made in accordance with § 34.67.

§ 34.29 Quarterly inventory.

(a) Each licensee shall conduct a quarterly physical inventory to account for all sealed sources and for devices containing depleted uranium received and possessed under this license.

(b) The licensee shall maintain records of the quarterly inventory in accordance with § 34.69.

§ 34.31 Inspection and maintenance of radiographic exposure devices, transport and storage containers, associated equipment, source changers, and survey instruments.

(a) The licensee shall perform visual and operability checks on survey meters, radiographic exposure devices, transport and storage containers, associated equipment and source changers before use on each day the equipment is to be used to ensure that the equipment is in good working condition, that the sources are adequately shielded, and that required labeling is present. Survey instrument operability must be performed using check sources or other appropriate means. If equipment problems are found, the equipment must be removed from service until repaired.

(b) Each licensee shall have written procedures for:

(1) Inspection and routine maintenance of radiographic exposure devices, source changers, associated equipment, transport and storage containers, and survey instruments at intervals not to exceed 3 months or

[redacted] Mike Lesser.

On 3 June 98 The padlock on the outter door of the Vault containing NDT Services' exposure devices & sources was removed and a new lock installed. The RSO, David Vaughn, is the only person having keys to this new padlock.

The removal, inventory of exposure devices, and instalation of the new lock was done in the presence of Mr. Tate and Mr. Burmudez of the NRC.

Jeremy Rochelle ARSO
5 June 98
David Vaughn

FACSIMILE REQUEST AND COVER SHEET

U.S. Environmental Protection Agency
Caribbean Environmental Protection Division
1492 Ponce De Leon Ave. Suite 417
San Juan, Puerto Rico 00907

TO: Mr.Jim Daloia

OFFICE: USEPA, Edison, NJ

PHONE:

FAX: (732) 906-6865

FROM: Ramon Torres

OFFICE: CEPD, E & S Branch

PHONE: (787) 729-6951 ext. 262

FAX: (787) 729-7748

DATE: January 26, 1999

SUBJECT: **Crossland Site More Information**

Number of Pages (including cover sheet): 14

Message: Hi Jim, Here is the technical information related to the cobalt 60 camera. Hope this help. Any questions please .

Sincerely,

Ramon Torres